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Diversification, Branding and Performance of Knowledge-Intensive Service Firms

Carolina Castaldi

Eindhoven University of Technology
School of Innovation Sciences
c.castaldi@tue.nl

Marco Giarratana

Bocconi University
Department of Management and Technology
marco.giarratana@unibocconi.it

Abstract

Knowledge-intensive service firms (KISFs) are characterized by a high level of intangibility both in term of production and output in a way that secrecy, knowledge codification and asymmetric information take central stage. This article draws attention to the intensity of product/service diversification and brand breadth as two channels through which KISFs manage this intangibility to achieve performance. A sample of US-based management consulting firms represents the test-bed for the hypotheses. US Patent and Trademark Office (USPTO) trademarks are functional to capture the properties of firms? diversification and branding. The results show that KISFs? performance is positively associated with diversification, but only when it is confined inside the service domain. Secondly, performance is enhanced by a low brand breadth, namely a portfolio of specialized product/service trademarks.

DIVERSIFICATION, BRANDING AND PERFORMANCE OF KNOWLEDGE-INTENSIVE SERVICE FIRMS

INTRODUCTION

According to the resource-based view, the primary sources of firms' competitive advantage and growth are unique and difficult to imitate intangible resources (Barney, 1991; Peteraf, 1993; Neffke & Henning, 2013). Intangible resources are typically embedded in people and/or collective routines which are highly specific to the idiosyncratic organization of each firm (Brush, Dangol & O'Brien, 2012). Additionally, they can be viewed as general-purpose assets (Gruber, MacMillan & Thompson, 2008; Feldman & Yoon, 2012; Eggers, 2012), often exploited to drive organizational processes of diversification insofar as they are fungible and susceptible to use in a range of different end-applications (Teece, 1982 and 1986, Chatterjee & Wernerfelt, 1991; Døving & Gooderham, 2008; Gambardella & McGahan, 2010).

While knowledge in its various forms is an intangible asset relevant to all companies, Knowledge-Intensive Service Firms (KISFs) are special examples of Starbuck's (1992) knowledge-intensive firms, since they not only use knowledge as their main input in production, but also sell products and services with a significant proportion of embedded intangibles. Typical examples are accountancy, law, management and engineering firms. While the intangibility of knowledge poses challenges at both supply and demand side, research has rarely assessed these two aspects simultaneously.

This article aims to fill this gap by focusing on two main open questions. First, in terms of production, we link the codification of intangible resources to the ability to diversify and the

impact on profitability. An interesting recent debate in the specialized business media has been the ability of KISFs to exploit their assets through diversification, moving for example to “selling popular hardware as well as clever software.” (*The Economist*, 2013: 7). Knowledge implies an important strategic trade-off. According to the knowledge-based view of the firm, companies need to be able to codify knowledge in order to recombine it into new knowledge or simply to be able to replicate successful resources throughout the organization. At the same time, knowledge codification also exposes firms to a higher risk of imitation (Kogut & Zander, 1992). There are benefits to a knowledge codification strategy (Zollo & Winter, 2002), but also costs as the considerable investment in codification does not always pay off for firms. For KISFs, an important step in knowledge codification is moving from pure service to product diversification (Brivot, 2011). Since their production is essentially based on intangibles, this important trade-off (diversification into products vs. secrecy) poses an interesting question about KISFs’ performance enhancements.

In terms of market output, KISFs’ output tends to be highly intangible and knowledge-based; these qualities can lead to market information failures because customers cannot judge ex-ante the quality (Bowen & Ford, 2002). When it comes to intangible offerings, asymmetric information becomes a common problem so that customers’ judgement tends to increasingly rely on social mechanisms, reputation or symbolic values (Fombrum & Shanley, 1990; Starbuck, 1992). Along this line of reasoning, branding approaches directed at channelling reputational capital and exploiting brands as meaningful symbols should represent an important dimension. It is also worth noting that brand strategies have become a rising theme of research in the strategy literature (Danneels, 2011; Chen, 2010; Hui, 2004).

The mechanisms of reputation building in those imperfect markets involving intangibles suggest that KISFs have different strategic options. Firstly, they can choose the level of diversification of their product and service offerings. Secondly, KISFs can invest in one broad brand name acting as a reference for all potential offers (a strategy of *high brand breadth*, as defined in this paper) or opt for a complex portfolio of different brands as well (*low brand breadth*). Marketing literature (e.g. Keller, 1993) defines the first type usually as names and logos that identify a general brand awareness attached to a firm's name and image. The second category covers different associations that consumers extract more directly from specific product or service attributes.

This paper tries to complement our knowledge in this field by testing the relationship between KISF diversification, brand breadth and performance. Empirically, we select for our test sample a group of professional service firms, namely 35 large US-based management consulting firms, analysing their performance in the period 2000-2009.

We capture the diversification and brand dimensions of KISFs by considering their trademark portfolios. Trademarks are the legal counterparts of brands and can be used by firms to identify unique products or services and advertising in markets. Semadeni (2006) shows, for the specific case of management consulting, that service marks, i.e. trademarks registered in service classes, bear information about firms' marketing strategies. Given that trademarks are registered for given product and service classes, and that they have a high life and death rate, they can potentially be used to measure both firm product/service diversification and brand breadth, dynamically, at the firm level. Among the formal IPR tools available to companies, trademarks are an interesting alternative for protecting intangibles and creating brand equity (Krasnikov, Mishra, & Orozco, 2009; Fosfuri & Giarratana, 2009).

Our results, using GMM IV regression models, show that KISFs' performance is positively associated with diversification, but only when diversification is confined into service domain. Results are not confirmed when diversification accounts for physical products. In addition, their performance is enhanced by a low brand breadth (portfolios of specialized trademarks).

This paper offers the following contributions. It is the first attempt to show the performance implications of diversification for firms with intangible assets both on the production as well as the demand side. Compared to recent contributions on diversification that address the role of competition (Wiersema & Bowen, 2008), demand (Wu, 2013) and opportunity costs in allocating resources (Levinthal & Wu, 2010), we focus more on the relatedness issue (see Neffke & Henning, 2013). Herein we show that for KISFs, the passage from service to products, given the different level of codification involved, could be a significant threshold that divides negative (or null) from positive performance outcomes. In sum, we suggest that the impact of diversification depends on a contingency (services vs. products) that is related to codification

Moreover, this is one of the first works on strategy in which branding takes central stage (Hui, 2004; Chen, 2010). Especially for service firms, the type of image and reputation linked to brands is an important strategic tool to compete in markets characterized by asymmetric information. By showing its impact on performance, we highlight the importance of strategic coherence and fine-tuning between product and company image and legitimacy (Zuckerman, 2000; Hsu, 2006).

As far as the empirical side is concerned, by using trademarks as a proxy of product/service and brand strategies, we can present results from a panel data set that also

accounts for endogeneity issues. This advances the nascent research on trademarks as a valuable proxy in social science research (Mendonça, Pereira & Godinho, 2004; Semadeni, 2006; Schautschick & Greenhalgh, 2013).

THEORY AND HYPOTHESES

Diversification and Performance

The structural transformation of industrialized economies from Fordist type systems to knowledge economies has gone hand in hand with a sectoral shift from scale-intensive manufacturing to knowledge-intensive services (Castellacci, 2009). In the knowledge-based society, the comparative advantage of firms has come to lie around their ability to skillfully manage knowledge rather than tangible capital (Starbuck, 1992). The increasing specialization of knowledge assets has also spurred the emergence of a distinct sector of providers of specialized knowledge, whose further growth has been accelerated by increasing outsourcing of tasks by the manufacturing sector.

Services firms that rely significantly on knowledge and human capital (KISFs) are at the heart of this phenomenon (Miles, 1993): their output is intangible and cannot be stored nor easily transported; service production is labor intensive rather than capital intensive while service output is often co-produced with clients' interaction and is thereby customized rather than standardized. These properties already explain why these firms typically cannot rely on traditional economies of scale or scope (Miles, 1993; von Nordenflycht, 2010). While ICT technologies have spurred major advances in the degree to which services can be standardized, codified and also transported (Miozzo & Soete, 2001), high-end services, such as those offered

by consulting firms, still strive to keep personalization and customization while enjoying some of the efficiency benefits of codification and standardization (Hansen et al., 1991).

Nevertheless, many KISF sectors have witnessed the emergence of large companies and an increasing concentration, from the accountancy sector (Suddaby & Greenwood, 2001) to management consulting (Sarvary, 1999) and advertising (von Nordenflycht, 2011). In the 2013 Forbes list of largest US companies, two business services giants, PriceWaterhouseCoopers and Ernst&Young stand out in the top-10 (Forbes, 2013).

Von Nordenflycht (2011) has suggested that the growth of KISFs goes hand in hand with increasing diversification. He observes how a process of size matching between clients and suppliers characterizes the evolution of many knowledge intensive industries, with large and diversified companies serving large clients and small companies serving small clients. The very large companies seem to combine the ability to coordinate large projects and provide whole packages of diversified services that satisfy the complex demand of large clients. In this respect, diversification is important for the growth of KISFs, not because of economies of scale and scope in production, but because of demand forces shaping their market strategies. For the case of IT providers, Kuruzovich et al. (2013) observe that customer ratings, a measure of demand satisfaction, are highest for firms providing complete packages of solutions including hardware, software and services. Their results are of course specific to a case with strong network effects, but their study is one of the few highlighting the differences in markets for products and services.

Greenwood et al. (2005) mention four competitive benefits of a diversification strategy for the accountancy sector. First, clients only have to deal with one supplier, thus fostering customer switching costs (Brush et al., 2012). Second, service firms enjoy economies of scope by using the same distribution channel. Third, firms can sell related services by leveraging

existing client relationships. Fourth, diversification helps KISFs to engage their employees in more interesting and diverse assignments, thereby increasing the chance of retaining key human resources. Greenwood et al. (2005) also argue that firms with a stronger reputation enjoy benefits from both supply and demand: they can attract the best human resources and save on transaction costs, but also charge higher prices to clients, who are also typically less willing to switch supplier.

The key advantages of diversification for KISFs, as listed by Greenwood et al. (2005), seem to univocally point to a positive relationship between diversification and performance. In sum, intangible assets and resources are sunk investments with a general purpose characteristic that naturally lead to increased performance through diversification (Teece, 1982 and 1986; Gruber et al., 2008; Feldman & Yoon, 2012). Yet, other characteristics of these firms indicate at least two counter-arguments.

KISFs typically use intangible resources like human capital, that are non-scale free resources with limited fungibility (Levinthal & Wu, 2010; Eggers, 2012). If KISFs are able to diversify, this signals the existence of reproducible, scale-free resources stemming from codification efforts. KISFs aiming to scale up specialized labour-intensive solutions, adjust accordingly their knowledge management strategies (Hansen et al., 1999) to exploit replication-based scale economies from codified systematized knowledge. For KISFs, the important stage in codifying knowledge is when they move from services to tangible products (software, manuals, databases, measurement tools, hardware) (Brivot, 2011). Several examples can be taken from the case of management consultancies, a sector in which some firms have become larger by offering standardized product-service solutions with a minimal level of customization. Ascertain TM is a revenue management and process evaluation toolset developed by the Management Consulting

Group; the software analyses, monitors and links data from different sources and networks inside a firm, like across operational and business support systems and inventories. This product is the outcome of a codification process and it allows the consulting company to move from a business model based on consultancy services to one based more on product licensing revenues.

The realization of tangible products generates a trade-off, though, because codification increases competition from two sides. First, if tangible products allow customers to produce their own solution, they can eventually cannibalize the professionals-embodied competences (Roberts & McEvily, 2005); this is a classic case of imitation by customers. Second, tangible products render more visible and less tacit a company's intangible resources that can be more easily imitated by actual KISF competitors. Additionally, competitors also profit from the fact that products can be more easily compared, in terms of relative price and features, by potential users than services. In a way, the availability of tangible offerings renders information less asymmetric, which in turn diminishes the ability of KISFs to defend the source of a sustainable comparative advantage. Finally, when a focal KISF extends diversification outside the service category, it can stretch its resources to a point at which economies of scope are overwhelmed by the costs of managing new product domains (Neffke & Henning, 2013). Ultimately, we propose the following hypothesis:

H1: For knowledge intensive service firms, higher diversification accounts for higher performance when it is realized inside the service domain.

Branding and Performance

Services are the quintessential example of experience goods, whose quality can only be evaluated after the actual consumption, and some services can even be credence goods, if their ex-post evaluation is complex or even impossible (Nayyar, 1990). The information asymmetries typical of services could be particularly high for KISFs (Starbuck, 1992; Skagg & Snow, 2004). In this respect, KISFs face challenges when promoting, protecting and leveraging their intangible reputational capital. Professional customers who cannot rely on previous experience for making an informed decision typically rely instead on the firm reputation (Fombrun & Shanley, 1990). Brands are a classic tool on which the reputation of a firm rests (Brown & Dacin, 1997), therefore the information a brand conveys can be key to reducing uncertainty over the quality of a service.

Branding, as a specific form of advertising, fulfils different roles. It reduces transaction costs in the market by reducing uncertainty about some of the properties of the provider during information search (Sappington & Wernerfelt, 1985; Lancaster, 1990). It also works as an appropriation tool since it helps to distinguish and identify the product/service in the market (Davis, 2009). Thereby it forms barriers to entry (Lancaster, 1990; Sutton, 1991; Appelt, 2009). It increases customer's loyalty, thereby strengthening the company's reputational assets. Moreover, firms' relations with loyal customers typically display higher levels of trust and commitment, which in turn can enable firms to extract more reliable information about customers' current and future needs (Cooper & Kleinschmidt, 1995; Prahalad & Ramaswami, 2004). In terms of systematic empirical evidence, strong brand equity has been related in the literature to higher consumer awareness, higher company performance and higher financial returns (Keller & Lehmann, 2006).

From a strategic point of view, we are interested in the branding mechanisms which increase the reputation and protect the value of KISFs' actions. We expect reputation building to be a key driver of KISFs' performance thanks to the inherent properties of their business: "most service organizations will depend upon the associations stakeholders make with their corporate names" (Davies et al., 2010: 530). This is crucial because if diversification is a common phenomenon for KISFs, one might argue how branding adapts and translates into actual strategies.

In this respect, firms face a twofold strategy: They decide whether to focus on one or very few consolidated brands that could be extended when diversification takes place, a strategy we label *high brand breadth*, or instead create new brands to be attached to each new offering, creating a portfolio of specialized brands, i.e. *low brand breadth*. In sum, there is a continuum of branding strategies to convey diversification: focusing on few very general brands that could be extended across different domains or multiplying brands managing a complex portfolio of specific brands. Marketing literature traditionally refers to this practice as the level of brand extensions (Aaker & Keller, 1990). Moreover, high brand breadth is usually realized through names and logos that identify a general brand awareness linked to firm name and image; low brand breadth deals with different associations that consumers extract from brands directly linked to specific products or services (Keller, 1990; Krasnikov et al., 2009).

High brand breadth may be cost-saving because it allows companies to enjoy economies of scale and scope in advertising and distribution and it could be used to convey a clear signal to the market (Cabral, 2009). Customers may reward companies that risk their name and act upon the belief that those companies would do their best to invest in the same quality throughout their offerings.

On the other hand, high brand breadth might expose firms to more risks in terms of negative publicity or failure of a specific diversification attempt; diversification coupled with a consolidated brand from existing product and service niches is not a risk-free strategy since it could backfire on brand image. Moreover, by using the same brand, firms renounce adapting to some sector-specific needs, reducing the potential to reach different segments of customers with diverse preferences. For example, it could be very difficult to sell under the same brand a service directed at environmentally concerned customers and polluting companies.

KISFs are characterized by strong information asymmetries, in which the extension of a brand to different markets might be beneficial for service firms only when it is considered 'legitimate' by the market (Nayyar, 1990), meaning that there might be important market constraints to brand extensions. For the specific case of management consulting firms, Greenwood et al. (2005) even talk about "reputation stickiness": given the complex and abstract nature of services offered, corporate clients do not easily extend a firm's reputation from one service to another. Semadeni (2006) argues that KISFs embed a tension between branding radically new offerings to differentiate themselves from competitors, and sticking to the core mission of their sector to increase their legitimacy and alignment to the sector's professional norms. When information asymmetries are strong, legitimacy is an important asset for firms who tend to restrict branding to core sectors because of the threats of reducing its power as a good signal. This means that firms will prefer to have brands very specific to the product/service segment targeted, i.e. low brand breath.

Clearly, the previous arguments hold in as much as KISFs only present themselves in the market with very tacit and intangible knowledge-based offerings. As soon as they are more visible and appear with codified knowledge, for example when KISFs include products in their

offering, they are giving away tangible characteristics from which customers can extract clues inferring quality and compare them with the firm's reputation conveyed through brands. This should reduce the asymmetric information presented to the market, relaxing the importance of the brand as a signal. A high level of brand breadth therefore removes the threat of potential backlashes, while remaining an important issue within the service domain. This leads to the following hypothesis:

H2: For knowledge intensive service firms, low brand breadth accounts for higher performance when firm diversification is realized inside the service domain.

EMPIRICAL ANALYSIS

Sample

We extract a sample of management and public relations service firms from Bureau Van Dijk's Osiris database by selecting all US public firms listed within SIC code 874¹. We select this sample to rely on firms that fundamentally base their success on intangible resources, i.e. knowledge embedded in human capital. The initial sample includes 94 firms. We choose US companies to ensure comparability in terms of trademark numbers, since we consider trademarks registered at the USPTO. Foreign companies registering trademarks at the USPTO might do so for different confounding reasons, whereby for example cultural distance plays an important role in shaping branding strategies (Giarratana & Torrisi, 2010)².

We further limit our analysis to public companies in order to have valid financial data, leaving us with a sample of 77 large firms. Then, we select companies that own at least one live trademark in at least one of the years considered. It turns out that 47 firms fulfil this condition

and we restrict the sample to KISFs that have reached a status that allows them to invest in branded services signalling and protecting their image in the market. This means that their brands have reached a threshold level of legitimation that they feel the necessity to protect from potential imitators. We propose some tests for selection bias in our model estimations in the final part of the empirics section.

From the Osiris database we take two variables: the turnover and the total number of employees. We consider data for the years 2000-2009, thereby constructing a balanced panel dataset. Wherever the Osiris variables are missing, we drop the entire observation for that specific company and year and keep only the complete ones, leaving a total of 172 observations.

For each company in the sample we also collect the trademarks registered at the USPTO. Trademarks are combinations of “words, phrases, symbols, or designs that identify and distinguish the source of the goods or services” (USPTO Documentation, <http://tess.uspto.gov>). Firms can register as a trademark a new firm name, a name of a product, a jingle, a slogan, a new image, or a logo. In this way, they secure legal protection of their investment in marketing, reputation for quality, brand names, and distribution channels. Even if trademarks do not protect against the imitation of the product per se, they do help to create a barrier to imitation because they avoid a similar product with a similar name or brand being sold in the same market. Trademark owners pay different types of fees for each class of goods or services for which a trademark is registered, and they have to prove periodically that they are using the trademark in the relevant market; even if the owner is willing to pay the fees, a trademark is cancelled if it is not commercially used for five consecutive years after registration. Academic interest in trademarks has only recently emerged. Previous studies show that trademarks represent a good proxy for the products and markets in which a firm operates, and that they are correlated with

performance measures and stock market value (Fosfuri & Giarratana, 2009; Krasnikov et al., 2009).

We collect trademark data from USPTO's TESS database. Trademarks get assigned to 45 IC and 60 US product classes. For each trademark, the IC class tends to be unique (one class per trademark) and it identifies the product category where the product or service is marketed. US classes represent the product categories to which the brand could be extended. Each trademark is usually linked to several US classes that are assigned from the good and service description provided by the applicant. Therefore, IC and US classes provide different information: while the unique IC code identifies the type of product/service underlying the trademark, the list of multiple US codes indicates the breadth of the trademarks, i.e. the product/service classes that are potentially covered by the same trademark. Trademark files also provide information on the status of the trademark, either 'live', i.e. still used in the market, or dead, i.e. dismissed. In sum, trademarks protect products and services in different markets and signal the actual presence of the company in that market, given the formal requirement that they are used in the market. On the other hand, they also account for the advertising investment related to the different products and services (Krasnikov et al, 2009).

Dependent variable and regression methods

To test our hypotheses, we are interested in fitting a model with performance as the key dependent variable ($PERFORMANCE_{it}$) and a vector of independent variables \mathbf{x}_{it} related to diversification and brand breadth. We measure performance of KISFs with an indicator of productivity calculated as the ratio between total turnover and employees. Greenwood et al. (2005) use a similar measure as a proxy of relative profitability. Given that KISFs rely strongly

on their human and intangible assets, considering a return per employee works well at capturing their economic performance (Lorsch and Tierney, 2002).

We take as dependent variable the performance at time $t+1$ and consider $t=2000, \dots, 2009$.

Our dependent variable is then: $PERFORMANCE_{i,t+1} = (\text{Turnover}_{i,t+1}/\text{Employees}_{i,t})$

Firm performance typically presents a dynamic structure, with lagged performance being correlated to current one. We choose then to estimate dynamic panel data models, whose basic form will be:

$$PERFORMANCE_{i,t+1} = PERFORMANCE_{i,t} + \beta' \mathbf{x}_{it} + u_{it} + \varepsilon_{it} \quad (1)$$

where u_{it} are fixed firm effects. Notice that we take the independent variables to be one-year lagged in their effect on performance; in other words, we assume that strategies are affecting performance with a time lag. Also, by including past performance, we control for heterogeneity in firm strategies and focus on dynamic differences as well as fixed firm effects.

Standard fixed and random effects panel-estimators prove to be biased because the lagged dependent variable is correlated with the unobserved individual-level effect u_i . Simply taking the first difference of the model eliminates the individual effects and allows for using instrumental variables that are consistent, but these estimates are not efficient. Arellano & Bond (1991) suggest using all the information available in the panel and constructing GMM estimators based on moment conditions by means of lagged values of the dependent variable and first-order differences of the covariates.

Practically, the first year when instruments are available from lagging performance is $t=3$, when $PERFORMANCE_{i1}$ can be used since it is not correlated with the error but is correlated with

($\text{PERFORMANCE}_{i2} - \text{PERFORMANCE}_{i1}$). At period T , the set of valid instruments is ($\text{PERFORMANCE}_{i1}, \dots, \text{PERFORMANCE}_{i(T-2)}$). Covariates can be treated as strictly exogenous, or different degrees of endogeneity can be taken into account. Predetermined covariates are such that $E(\mathbf{x}_{it_{is}}) \neq 0$ for $s < t$ and 0 otherwise. This is the assumption we consider for our independent variables: this means that a positive shock in performance today can have an effect on breadth strategies tomorrow. For predetermined variables, only $[x_{i1}; x_{i2}, \dots, x_{i(s-1)}]$ are valid instruments at period s .

The residuals can be used to estimate the error variance-covariance matrix and obtain an optimal, two-step, GMM estimator. Arellano & Bond (1991) show that two-step estimators may be biased for small samples and recommend the use of a one-step estimator to draw inferences. We opt for one-step estimators. Since the firms' trademark strategies might be endogenous to their performance, we treat all our trademark-based variables as endogenous in the GMM estimations, which means that we use their lagged values as instruments next to the lagged values of the dependent variable.

In order to take into account the different effects of diversification within service sectors *vis-à-vis* physical products, we run two additional regressions after splitting the sample in two. The first regression accounts for the sample of cases of firms at each time t that have not released at time t any physical product ('Pure service cases'). The condition that we apply is that we select cases where the entire portfolio of live trademarks owned by firm i in year t only covers IC classes in the range 35-45 (service classes of the NICE classification). The second additional regression includes observations of firms that at time t have already released a physical product in the market. Operationally, their trademarks cover at least one product class, i.e. one class in the range 1-34.

Independent variables of theoretical interest

In order to capture firms' strategies, we construct the following trademark-based variables for our sample firms.

Diversification. Each trademark has usually a unique IC product/service class assigned that determines the goods or services on which the mark is used. There are 34 product categories and 11 service categories. For each firm we know how many live trademarks in the different IC classes the firm owns in a certain year t . We then calculate a Herfindhal index for each firm at time t . Such a concentration index takes a max value of 1 when all trademarks are registered in the same IC class and a min value of $1/N$, with N equal to the number of IC classes available, when each class is covered by one trademark. There are 19 IC classes appearing in our sample, and given the problem of small sample bias, we follow the standardization suggested by Hall (2005) and adopt the following formula:

$$\text{DIVERSIFICATION}_{i,t} = - (\text{Herfindhal_IC}_{i,t} - 1/N_i) / (1 - 1/N_i)$$

Note that for a straightforward interpretation, we insert a negative sign at the beginning so that the higher DIVERSIFICATION variable means a firm's diversification is higher.

Brand Breadth. Even if assigned to a unique IC product/service class, each trademark could be classified across different product and service categories. There are 60 US product and service classes. US classes are assigned to a trademark given the description of the products and services to which the trademark could be extended. For example, the Apple trademark "iCloud" (serial number 79056140), registered in the IC class 009 "Electrical and Scientific Apparatus", is assigned to five US classes, namely 021 (Electrical Apparatus, Machines and Supplies), 023 (Cutlery, Machinery, Tools and Parts Thereof), 026 (Measuring and Scientific Appliances), 036

(Musical Instruments and Supplies), and 038 (Prints and Publications). The more the US classes in which a trademark is assigned, the more the underlying brand is potentially extendable to different product and service domains. We then calculate a Herfindhal index of concentration for the US classes covered by the portfolio of live trademarks of each firm in each year. We standardize it according to Hall (2005) to avoid small sample bias, given that the number of US classes available in our sample is $M=39$. Thus our measurement reads:

$$\text{BRAND BREADTH}_{i,t} = - (\text{Herfindhal_US}_{i,t} - 1/M_t) / (1 - 1/M_t).$$

Note that we insert a negative sign at the beginning so that the higher the BRAND BREADTH, the higher the potential extensions of a firm's brand portfolio. Sandner & Block (2011) use this measurement as a proxy for the value of trademarks: the more US classes that are covered by the trademark, the higher the costs, which implies that the company is investing more in protecting trademarks. A higher breadth also means that the company is putting more effort into blocking imitators, as other companies are prevented from using that brand in their sectors of activity. This is confirmed by Melnyk et al. (2013) who show that broader brands are less likely to be abandoned.

As a control variable we count the number of live trademarks owned by each firm in each year and standardize it by firm size, proxied by the number of employees. The stock of trademarks changes annually because some trademarks 'die' and new ones are registered. This control signifies controlling brand proliferation according to the size of the firm. We take the logarithm of this ratio and define it in such a way that the BRAND INTENSITY_{it} is zero when the company does not own any live trademarks in that year:

$$\text{BRAND INTENSITY}_{i,t} = \ln ((\text{Number of Live Trademarks}_{it} / \text{Employees}_{it}) + 1)$$

We also insert the average age of live trademarks in each firm's portfolio in each year. TRADEMARK AGE_{it} is an important control because firms can decide to renew trademarks by cutting old ones and substituting with new ones (therefore age should remain constant or decrease), or by maintaining the old ones always live and continually churning out the newer ones (so that age increases).

In terms of our sample data, Table 1 shows preliminary evidence, dividing the sample in cases with or without products. For the two subsamples, we calculate the frequency of observations and the average performance, together with a relative measure of variation, the coefficient of variation (CV is the ratio between standard deviation and average performance). The data suggest that for the pure service cases, most firms limit themselves to specialized brands. For the cases with products, the most striking evidence is that the distribution of cases among the quadrants is more even, suggesting that firms are less constrained in their strategy selection. Variation in performance is also very much comparable across strategies. These unconditional descriptive results prompt of course the question whether they also stand in a multivariate setting.

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Table 2 gives the basic overall descriptive statistics for our variables.

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Results

Table 4 shows the results of GMM regressions in which endogenous variables are estimated with the Arellano and Bond (1991) technique. We perform the estimation for all cases (A), pure service cases (B) and cases with products (C). Model 1 is the baseline model where performance only depends on past performance. The other models introduce all our trademark-based variables progressively.

At first glance, the significant differences in the estimates in the three models (A, B and C) suggest how for KISFs the passage from service to products should be treated separately, since it accounts for different dynamics and impacts on the main variables.

Starting from the goodness of fit, we report the Wald tests. These tests check for the overall significance of the model coefficients compared to the null model including only a constant. The tests clearly reveal that the models perform very poorly for the cases with products: hardly any of our independent variables play a significant role in explaining performance, except past performance. Instead, the models for pure service cases are all statistically relevant. This confirms that specifying our hypothesis for only pure service cases is meaningful, and that cases with products apparently follow very different dynamics when it comes to the effects of both diversification and branding.

$DIVERSIFICATION_{it}$ is significantly related to performance for pure service firms, which provides empirical support for Hypothesis 1. Hypothesis 2 also gains support from data: the lower the $BRAND\ BREADTH$, the higher the performance, always for pure service firms. KISFs that exploit economies of scope from their intangibles, managing a specialized portfolio of brands within services, command a higher performance.

In terms of controls, BRAND INTENSITY tends to exert a negative signal, meaning that the stock of brands is limited by the firm's ability to spur growth in size; in fact the brand proliferation should show a growth rate inferior to the KISFs size growth to have a positive impact on performance. This is suggestive of fine-tuning brand strategies with the firm potentialities to extend its market size. AGE is never significant, meaning that AGE remains fairly constant and that firms periodically update their portfolios to match their specific market niches.

As for judging the validity of the IV estimation, we report the significance of the Sargan test. This test takes as null hypothesis that the over-identifying restrictions of the instruments are valid. If the test rejects this hypothesis, the model specification rests on shaky grounds. In our case, the Sargan test for the full model does not entirely confirm the validity of our instrumental variables ($\text{Prob} > \chi^2 = 0.0113$). However, as Arellano and Bond (1991) note, the Sargan test for the one-step estimator has a tendency to reject too often in the presence of heteroskedasticity.

If we compare the regressions for the pure services cases with the overall sample (A) and the product sample (C), while none of the covariates of interest exerts significance in the product cases, the overall sample confirms the results except for $\text{DIVERSIFICATION}_{i,t}$. The straightforward conclusion is that our hypotheses hold when confining inside services and that KISFs' diversification into products is a more complex phenomenon to analyse.

Insert Table 3 About Here

As robustness checks, we tackled the issue of a possible selection bias. We focus only on firms owning trademarks, but this trend could be related to variables that we also include in our model. Since it is not possible for us to estimate this trend with the data at hand, nor conceptually

possible to define our theoretical variables of interest for firms not owning trademarks, we opt for an indirect test. We define a selection dummy, S_{it} which is 1 when a firm does its own trademarks in that year, and otherwise is 0. We also recode all our trademark-based variables into new variables where missing values (corresponding to $S_{it}=0$) are set to zero. We then re-estimate all our regression models using the recoded independent variables and add the selection dummy as an additional control. If the selection dummy proves insignificant and the other variables have qualitatively similar effects on the models, then a bias from selection can be safely disregarded. For all our model specifications, this turns out to be the case (see Table 4 for the entire sample). This evidence suggests there is no significant bias due to selection in our estimation.

Insert Table 4 About Here

CONCLUSIONS

This article analyses the determinants of performance on a sample of Knowledge-Intensive Service Firms (KISFs). The empirical evidence confirms that performance is enhanced with higher diversification and with a portfolio of specialized brands (low brand breadth). However, these results only apply if KISFs do not extend diversification into tangible products.

Therefore, this research first confirms that diversification is an important avenue for increasing performance when it is managed coherently and fine-tuned with branding strategies (Hui, 2004). Managers should focus on the ability to exploit their firm's intangible resource

potential in order to tap different service niches and customize their offer accordingly. This should probably be accomplished with a modularity competence, that is, the ability to propose different combination of teams with different skills to create novel offers (Greenwood et al., 2005). If this is so, a necessary condition to accrue performance is a reliable map of all the skills in a focal KISF (Criscuolo et al, 2007; Neffke & Henning, 2013), and the ability to design potential combinations of expertise according to the type of demand. Novel research could dig deeper in this area, proposing empirical evidence to match diversification and performance data with some measure of the modularization and team rotation.

However, these results do not apply when a focal KISF has diversified its offer into products. Most probably, the passage from service to products requires costs and competences that are difficult to nurture only within the boundaries of a company, given also the complexity of managing different distribution channels for off-the-shelf products (Brivot, 2011). More generally, this suggests that moving outside services is a strategic decision that begs the question: which business model do KISFs deploy? Therefore, besides exploiting the modularity of skilled personnel, other variables should account for the relationship between performance and diversification when KISFs include products in their offer. A possible intuition is that diversification through M&As is important when KISFs enter into physical products (Van Nordenflycht, 2011); future studies could then test if, when and how financial acquisitions are the real means of increasing performance when KISFs exploit their intangible resources outside the service domain. Anyway, managers of KIFSs should be aware that moving into products is a strategic decision that generates different consequences compared to tapping into several niches of the services industry.

In terms of brand strategies, our results seem to confirm that service markets have important asymmetric information that limits the extent of widening similar brands to different niches. If the image and reputation attached to a brand in a particular service niche are key to reducing transaction costs with potential clients, the risks of diluting this efficacy by extending the same brand to different niches are too high (Davies et al., 2010). First of all, a failure in a new product niche tapped with a consolidated brand could compromise the reputation of the same brand in the traditional market. Secondly, the costs could be too high, or the efficacy too low, of extending the same brand to new clients and niches when brand reputation is particularly sticky for the selected group of customers (Brush et al., 2012). This granted, the article suggests the presence of diseconomies of scope at the level of brand related to reputation and legitimacy. The direct consequence is that investments directed at creating a high brand reputation, which are supposedly mostly sunk, tend to be niche-specific and might not be extended to other service niches. Therefore, they should be interpreted more as barriers to entry than as an opportunity to exploit economies of scale and scope at marketing level (Appelt, 2009). Further research could investigate the relationship between some measure of brand value in services and to what extent they are correlated to potential and realized entry barriers *vis-à-vis* the potential threat of cannibalization when extended to other domains.

This line of reasoning is also of particular importance to managers. The main take-away from this study recommends performing low brand breadth along with diversification rather than extending consolidated brands when a new service niche is tapped. Consequently, high coordination between the marketing division and “production” side of a company is advised, in order to better understand the role of brands in a particular niche. Needless to say, a more fine-grained analysis could investigate what real differences exist among different brands

trademarked by KISFs. Even when firms register multiple brands, the actual differences (names, colours, logos) may not be significant.

Another line of investigation could address how customer perception is linked to actual trademarked brands, given that customer-based measures of performance are particularly relevant for services due to their intrinsic interactive nature (Bowen & Ford, 2002). This could only be realized with direct consumer surveys or laboratory research to accomplish a twofold aim. Firstly it is essential to measure how the extension of a brand to different sectors causes losses in customers' perception of uniqueness due to diseconomies of scope from the demand side. Secondly, these approaches could decompose the evaluation of a global portfolio of KISF brands into the values of single brands, testing also the presence of externalities among them.

An important limitation of this work is that we do not have any proxy for the sunk-investments that firms make beyond a brand, nor for the actual market value of the brand. Clearly, if the results of this paper are quite general, brands with higher costs and values should be subject to more restraints in terms of potential extensions. Studies that could estimate the relationship between branding strategies adding more heterogeneity in terms of firm brands (i.e. measuring the different investment for each brand), will not only confirm part of our results, but also open up new and very fruitful lines of investigation.

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FOOTNOTES

¹This includes: Management services (8741), Management consulting services (8742), Public relations services (8743), Facilities support management services (8744) and Business consulting services, not classified elsewhere (8748).

²We focus on the organic growth of these organizations, i.e. excluding mergers and acquisitions (M&As). This highlights the link between diversification, brand strategies, firm intangibles and performance, avoiding the confounding effects of financial mergers. Trademarks can change owner when sold or acquired by companies or traded in M&As. The USPTO database details changes in ownership if the acquirer maintains a brand without a stand-alone subsidiary. If after acquisition, a subsidiary maintains its independence, it will maintain the ownership of the brand. We consider only trademarks registered and owned by the companies in our sample without grouping for holding ownership.

Table 1

Descriptive statistics on different branding strategies in our sample.

Services cases			
		BRAND INTENSITY	
		Above the median	Below the median
BRAND BREADTH	Above the median	Frequency: 4% PERFORMANCE: MEAN: 314.92 CV: 0.32	Frequency: 10% PERFORMANCE: MEAN: 131.00 CV: 0.86
	Below the median	Frequency: 42% PERFORMANCE: MEAN: 190.79 CV: 0.87	Frequency: 45% PERFORMANCE: MEAN: 108.09 CV: 0.71
Cases with products			
		BRAND INTENSITY	
		Above the median	Below the median
BRAND BREADTH	Above the median	Frequency: 18% PERFORMANCE: MEAN: 266.105 CV: 0.51	Frequency: 26% PERFORMANCE: MEAN: 204.28 CV: 0.49
	Below the median	Frequency: 30% PERFORMANCE: MEAN: 301.75 CV: 0.44	Frequency: 25% PERFORMANCE: MEAN: 198.86 CV: 0.51

Table 2

Descriptive statistics: mean, standard deviations and correlation matrix^a.

All cases (A)	MEAN	STDEV	1	2	3	4	5	6
1.PERFORMANCE _{t+1}	215.42	358.45	1					
2.PERFORMANCE _t	209.09	356.53	0.76***	1				
3.DIVERSIFICATION _{it}	-0.62	0.30	0.24**	0.22*	1			
4. BRAND INTENSITY _{it}	0.04	0.10	0.25***	0.21**	-0.05	1		
5. BRAND BREADTH _{it}	-0.24	0.17	0.11	0.05	0.49***	-0.07	1	
6.TRADEMARK AGE _{it}	5.05	4.01	0.28***	0.32***	0.09	0.03	-0.43***	1

^a We report the pairwise correlation coefficients and their Bonferroni-adjusted significance:

*: p-value<.05

**: p-value<.01

***: p-value<.001

Table 3

GMM instrumental variables regression results^a. Dependent variable is PERFORMANCE_{i,T+1}

All cases (A)					
PERFORMANCE _{i,t+1}	Model 1	Model 2	Model 3	Model 4	Model 5
PERFORMANCE _{IT}	0.27*	0.21*	0.17*	0.19**	0.20**
DIVERSIFICATION _{it}		18.07	50.77	93.06	72.93
BRAND BREADTH _{IT}				-232.40**	-198.72*
BRAND INTENSITY _{it}			-415.66**	-378.96*	-368.44*
TRADEMARKS AGE _{it}					0.72
No. of obs	205 (35)	172 (32)	172 (32)	172 (32)	170 (32)
(No. of firms)					
p-value Wald test	0.0019	0.0402	0.0032	0.0000	0.0000
p-value Sargan test	0.0000	0.0004	0.0000	0.0023	0.0113
Pure service cases (B)					
PERFORMANCE _{i,t+1}	Model 1	Model 2	Model 3	Model 4	Model 5
PERFORMANCE _{it}	0.15	0.10	-0.05	-0.08	-0.08
DIVERSIFICATION _{it}		234.47*	226.65*	258.22**	247.49*
BRAND BREADTH _{it}				-1761.00*	-1779.99*
BRAND INTENSITY _{it}			-1954.42*	-1737.92*	-1808.87*
TRADEMARKS AGE _{it}					-3.26
No. of obs	52 (12)	52 (12)	52 (12)	52 (12)	51 (12)
(No. of firms)					
p-value Wald test	0.3286	0.0700	0.0031	0.0022	0.0067
p-value Sargan test	0.0015	0.1061	0.0097	0.0143	0.0173

Cases with products (C)

PERFORMANCE _{i,t+1}	Model 1	Model 2	Model 3	Model 4	Model 5
PERFORMANCE _{it}	0.14	0.10	0.21*	0.20*	0.20*
DIVERSIFICATION _{it}		-161.76	-159.46	199.46	222.70
BRAND BREADTH _{it}				182.16	245.07
BRAND INTENSITY _{it}			-4.20	10.58	38.47
TRADEMARKS AGE _{it}					4.69
No. obs	96 (20)	96 (20)	96 (20)	96 (20)	95 (20)
(No. firms)					
p-value Wald test	0.2718	0.2431	0.0788	0.1308	0.1253
p-value Sargan test	0.0000	0.0030	0.0258	0.0322	0.0308

^a Results of the one-step GMM Arellano-Bond estimation of the dynamic panel regression model. Instruments are created from the lagged dependent variable and all lagged independent variables. We report the estimated coefficients and their significance:

*: p-value<.05

** : p-value<.01

***: p-value<.001

Table 4

GMM instrumental variables regression results accounting for selection.

All cases					
DV:PERFORMANCE _{i,T+1}	Model 1	Model 2	Model 3	Model 4	Model 5
PERFORMANCE _{iT}	0.28**	0.20*	0.17*	0.18**	0.18**
RECODED		8.25	48.59	106.34*	76.11
DIVERSIFICATION _{iT}					
RECODED BRANDING				-225.69**	-173.10*
BREADTH _{iT}					
RECODED BRAND			-429.25**	-402.76**	-393.92**
INTENSITY _{iT}					
RECODED					1.63
TRADEMARKS AGE _{iT}					
S _{iT}	-17.37	-12.49	35.02	34.00	24.933
No. of obs	205 (35)	205 (35)	205 (35)	205 (35)	205 (35)
(No. of firms)					
p-value Wald test	0.0073	0.0798	0.0029	0.0000	0.0000
p-value Sargan test	0.0000	0.0004	0.0000	0.0023	0.0003

*: p-value<.05

**: p-value<.01

***: p-value<.001